Campaigns

Mission Supporting Goals and Objectives

Campaigns are focused efforts involving the three weapons laboratories ("tri-lab"), the Nevada Test Site, the weapons production plants, and selected external organizations to address critical capabilities needed to achieve key program objectives. Campaigns are technically challenging, multi-function efforts that have definitive milestones, specific work plans, and specific end dates. The approach was initiated several years ago in the planning and execution of several new Defense Programs activities, including the Accelerated Strategic Computing Initiative and the Enhanced Surveillance Program.

Campaign Goals/End States and FY 1999 - FY 2001 Performance Measures

Currently, there are 17 Stewardship Campaigns. Each Campaign is planned and managed through individual Program Plans and executed each year through annual Implementation Plans. Program Plans are available for additional information. There is no funding requested in FY 2001 for implementation of the High Explosives/Assembly Readiness and Nonnuclear Readiness campaigns; we plan to initiate these two campaigns in FY 2002. Below are descriptions of the 17 campaigns, which are described below along with the end states and milestones for each. Defense Programs will be developing baseline end dates for all campaigns in FY 2000.

Stewardship Campaigns

Campaigns	Goals/End States	FY 1999 - 2001 Performance Measures
Primary Certification supports experimental activities to develop and implement the ability to certify, without nuclear testing, rebuilt and aged primaries to within a stated yield level.	Develop and demonstrate the tools required to certify the performance and safety of any rebuilt or aged primary to a specific yield.	Evaluate historical test data for archiving. Assess the effect of engineering and manufacturing technologies on pits. Conduct hydrodynamic experiments and test and validate computational models. Develop an improved dynamic mix model of a boosted nuclear explosion. Obtain equation of state (EOS) and spall data from subcritical experiments. Develop thermochemically based high explosive EOS.

Campaigns	Goals/End States	FY 1999 - 2001 Performance Measures
Dynamic Materials Properties supports physics-based, experimentally-validated data and models of all stockpile materials at a level of accuracy commensurate with the requirements of the Primary and Secondary Certification Campaigns.	Develop experimentally validated models of all materials which are essential to assess stockpile performance.	Measurements of fundamental physical properties of deuterium. Interim Pu release equation of state, including refinements from Hugoniot data. Measurement of deuterium fluid phase diagram. Initiate experiments on the Joint Actinides Shock Physics Experimental Research (JASPER) facility at the Nevada Test Site. Initial dynamic measures of strength of materials. Experimental characterization of ejecta. Dynamic measurements of interfacial interactions in weapons materials. Initial tabular high explosive equation of state incorporating new overdriven data. Initial tabular foam description including loading response and decomposition.
Advanced Radiography supports research and development technologies for multi-view, time-gated images of imploding surrogate primaries, with sufficient spatial resolution to resolve uncertainties in primary performance. This utilizes advanced multi-time, multi-view, x-ray diagnostic techniques on DARHT, and further development and evaluation of proton radiography techniques.	Provide the technology to obtain 3-D motion pictures of imploding surrogate primaries.	Achieve optimum/minimum spot size on DARHT I target. Complete design of multi-pulse target for DARHT II. Complete evaluation of requirements for advanced radiography facilities. Identify preferred long-term material source.

Campaigns	Goals/End States	FY 1999 - 2001 Performance Measures
Secondary Certification and Nuclear-Systems Margins includes theoretical understanding, along with experimental and computational activities which will determine the minimum primary factors necessary to produce a militarily effective weapon.	Determine and document the minimum primary factors necessary to produce a militarily effective weapon.	Begin an evaluation of material-property uncertainties. Identify previously conducted underground tests and AGEX with relevant data, and complete analysis of those tests and experiments. Complete the reevaluation of primary-yield determination (radiochemistry and prompt diagnostics analysis). Complete the evaluation of material-property sensitivities on secondary performance. Identify issues and relevant underground test data associated with features and aging, and also important to marginal performance.
Inertial Confinement Fusion Ignition and High Yield addresses high energy density physics issues for the nuclear weapons Stockpile Stewardship Program and develops a laboratory microfusion and high-yield capability for defense and energy applications.	Start of ignition physics implosion experiments (subject to NIF rebaselining), and the enhancement of experimental capabilities for stewardship.	Advanced capabilities to improve ICF target physics necessary to achieve ignition on NIF, including measurement of the deuterium equation of state (EOS), designs for higher efficiency hohlraums, improved capsule designs, and the activation of the Omega cryogenic target handling system. Direct drive illumination uniformity better than 1% was demonstrated on Omega, in support of assessing direct drive for NIF. Complete Z beamlet x-ray backlighter for Stockpile Stewardship experiments on Z. Start national cryogenic target system project. Evaluate NIF hohlraum energetics and laser core diagnostic options. Perform approximately 1600 experiments on Omega and Z in support of ignition and weapons physics campaign goals. Perform high-density cryogenic implosions on Omega and complete a hydrodynamic simulation code for 1D, 2D, and 3D direct drive target performance evaluations. Complete conceptual designs for NIF shock-timing and symmetry diagnostics.

Campaigns	Goals/End States	FY 1999 - 2001 Performance Measures
Certification in Hostile Environments develops the certification tools and microelectronics technologies required to ensure that refurbished weapons meet the Stockpile to Target Sequence (STS) hostile environments requirements.	Demonstrate the capability to support enduring stockpile certification and life extension without underground tests, through radiation hardening, and modeling and validation.	Begin analysis of DSW pit tests on the W76 and W88. Define set of above- and below-ground nuclear test data to be used to benchmark modern code calculation. Improve Saturn x-ray source to produce environments required for effects testing.
Defense Applications and Modeling develops next generation of higher performance software required to certify the performance and safety of the stockpile along with the capabilities to further demonstrate, evaluate, assess, and document the predictive capabilities of the codes and their underlying models.	Provide validated 3-D, high-fidelity physics, full-system simulation codes required for engineering, safety, and performance analyses of the stockpile.	Employ formal software engineering methods for code verification. Validate prototype codes by comparison with both integral experiments and phenomenological tests. Develop advanced materials and physics models and implement advanced models in simulation codes.
Weapon System Engineering Certification establishes science-based certification methods that quantify performance and uncertainties of the stockpile and reduce cost, drive test configurations to most critical event environments, and maximize understanding.	Produce and demonstrate the methodology and metrics to certify a weapon system in the flight and abnormal environments using modeling and simulation tools.	Define modeling and simulation based certification requirements for the flight and abnormal environments. Begin W76 flight models (version 1.0) validation. Complete design for first enhanced RV/RB flight-test article.
Enhanced Surety will provide validated technology for inclusion in the stockpile refurbishment program to assure modern nuclear safety standards are fully met and to provide a new level of use-denial performance.	Demonstrate enhanced surety and initiation options for the entire stockpile.	Develop Full Scale Engineering Development (FSED)-ready technologies for improved surety options for the W80 and W76 systems using current technologies and capabilities
Enhanced Surveillance will provide a validated basis to determine if or when components must be replaced.	Provide documented component lifetime assessments; have predictive tools in place to identify aging defects prior to any impact to safety, reliability, or performance; and develop tools to identify all birth defects in new materials prior to introduction into the stockpile. Meet defined SLEP and certification-driven surveillance requirements.	Vulnerability tests on oldest pits available. Benchmark canned subassembly corrosion models with simulated aging tests. Complete experiments to confirm HE aging mechanisms and benchmark model. Predict performance of highest risk nonnuclear energetic components.

Campaigns	Goals/End States	FY 1999 - 2001 Performance Measures
Advanced Design and Production Technologies (ADAPT) will integrate and systematically deploy capabilities to deliver qualified refurbishment products upon demand. This will be accomplished by developing multiple, fast turnaround engineering options through virtual prototypes and implementing modern product data management and collaboration tools.	Provide the capability to deliver qualified stockpile life extension program refurbishment products upon demand at one-half cost, one-half the current time and with zero stockpile defects.	Provide secure, authenticated, high speed network available at designer's/producer's desktop. Perform pilot project in Model-Based Engineering and Manufacturing (MBE/M). Demonstrate processes for fabricating and packaging high shock environment miniaturized circuits. Continue robotics at FY 2000 level. Continue planning for deployment of integrated design/manufacturing models and process development/agile manufacturing activities.
Pit Manufacturing Readiness includes operating support and the procurement of equipment for the reestablishment of a war reserve pit production capability and a limited production capacity at LANL; initiation of the manufacture of quantity pits for certification and ultimate placement into the nuclear weapons stockpile; and planning and implementing a manufacturing capacity for long-term support of the stockpile.	Develop an automated, expandable, robust manufacturing capability to produce replacement pits for stockpiled warheads, without underground testing, within 19 months of the establishment of a production need.	Continue manufacture of development pits leading toward the manufacture of a certifiable W88 pit.
Secondary Readiness ensures present and long-term manufacturing capabilities (equipment, people, processes) for production of secondaries.	Develop the capability to deliver a first production unit secondary within 36 months of receiving a request.	Validate material requirements and specifications. Evaluate designs for improved manufacturability.
HE/Assembly Readiness ensures present and long-term manufacturing capabilities for high explosive fabrication and weapon assembly. Transforms NWC manufacturing operations to meet stockpile requirements with lower costs and faster responses to changing needs.	Develop the capability for HE/assembly readiness, by providing the technologies, facilities, and personnel for high-explosives component manufacturing, production re-qualification, and weapon assembly/disassembly operations to support a Phase 4 cycle time of 19 months.	This campaign is scheduled to start in FY 2002.

Campaigns	Goals/End States	FY 1999 - 2001 Performance Measures
Nonnuclear Readiness ensures present and long-term manufacturing capabilities for Nonnuclear production.	Bring all identified production vulnerabilities to an acceptable level of risk; develop advanced technologies to yield defect-free products at half the traditional cost and within 19 months after the need is defined.	This campaign is scheduled to start in FY 2002.
Material Readiness supports the consolidation of weapon-grade HEU resources at Y-12. Provides critical inventory information, processes, and technologies to ensure availability of nuclear and nonnuclear special materials to support SLEP rebuilds and component production campaigns. Provides modern storage facilities, monitoring instrumentation and containers for enhanced protection of national security materials.	Develop a fully integrated material management system supporting strategic material needs with either stockpiled material or the capability to produce new material.	Complete survey of national security materials and requirements. Complete gap analysis and identify strategy or program elements for filling gaps.
Tritium Readiness will implement the Secretarial Record of Decision, which selected the Commercial Light Water Reactor option as the primary technology for the production of tritium.	For the primary technology (CLWR): Establish the production systems and operations systems to produce tritium in a commercial reactor so that tritium can be delivered to the stockpile. Suspend preliminary design of the APT plant.	For the primary technology (CLWR): Establish contracts with vendors for the procurement of Tritium Producing Burnable Absorber Rod (TPBAR) components, final assembly and long-term transportation services. Submit documents to initiate the process to amend the Nuclear Regulatory Commission operation license of the Tennessee Valley Authority's Watts Bar and Sequoyah reactors. For the backup technology (APT): Suspend preliminary design.

Funding Schedule

(dollars in thousands)

Campaigns	FY 1999	FY 2000	FY 2001	$ Change	% Change
Primary Certification	41,996	29,468	41,400	11,932	40.5%
Dynamic Materials Properties	68,206	62,386	64,408	2,022	3.2%
Advanced Radiography	27,122	37,855	43,000	5,145	13.6%
Secondary Certification and Nuclear System Margins	45,520	44,375	52,964	8,589	19.4%
Inertial Confinement Fusion Ignition and High Yield Margins	97,624	99,737	120,800	21,063	21.1%
Certification in Hostile Environments	16,399	13,751	15,400	1,649	12.0%
Defense Applications and Modeling	183,162	227,732	249,100	21,368	9.4%
Weapons Systems Engineering	23,900	14,924	16,300	1,376	9.2%
Enhanced Surety	47,556	38,276	40,600	2,324	6.1%
Enhanced Surveillance	82,877	74,042	89,651	15,609	21.1%
Advanced Design and Production Technologies	109,630	76,393	75,735	-658	-0.9%
Pit Manufacturing Readiness	75,881	69,969	108,038	38,069	54.4%
Secondary Readiness	0	0	15,000	15,000	100.0%
Nonnuclear Readiness	800	0	0	0	0.0%
Materials Readiness	37,900	39,088	40,511	1,423	3.6%
Tritium Readiness	141,000	100,602	77,000	-23,602	-23.5%
Subtotal, Campaigns	999,573	928,598	1,049,907	121,309	13.1%

(dollars in thousands)

Old Structure	FY 1999	FY 2000	FY 2001	$ Change	% Change
Stockpile Stewardship	632,579	613,379			0.0%
Stockpile Management	366,994	315,219			0.0%
Subtotal, Campaigns	999,573	928,598	1,049,907	121,309	13.1%

Detailed Program Justification

(dollars in thousands)

Campaigns	FY 1999	FY 2000	FY 2001
Primary Certification			
# Develop an improved thermonuclear boost model to support the campaign certification goal	7,700	2,205	7,900
# Assess the impact of new manufacturing technologies on remanufactured components; and develop a pit engineering evaluation of each stockpile weapon system	6,083	5,184	6,800
# Validate improved materials properties models and use these models to improve computational predictions of primary performance	14,811	11,328	10,000
# Conduct integrated hydrodynamic experiments to validate computational models and to demonstrate a certification methodology for aged and remanufactured components	8,062	6,559	11,800
# Analyze historical nuclear test data and develop an accessible archive of information relevant to the certification of primaries in the enduring stockpile	5,340	4,192	4,900
Total, Primary Certification	41,996	29,468	41,400
Dynamic Materials Properties			
# Develop physics-based and experimentally validated data and models for the thermodynamic properties of stockpile materials, with emphasis on metals (Pu and others) and boost gas (DT)	15,217	12,908	23,900
# Develop physics-based and experimentally validated data and multi-scale models for the mechanical constitutive properties of stockpile materials, with emphasis on Pu and other metals	29,966	21,018	15,400
# Develop physics-based and experimentally validated data and models for high explosives (HE), organics and foams as they specifically affect performance and safety	11,305	15,380	15,300
# Develop a quantitative understanding of how process variables determine the microstructure and composition of materials which ultimately control their critical performance properties	5,267	5,220	6,340
# University partnerships in dynamic materials research	6,000	7,392	3,000

(dollars in thousands)

Campaigns	FY 1999	FY 2000	FY 2001
# Physical data computational user support	451	468	468
Total, Dynamic Materials Properties	68,206	62,386	64,408
Advanced Radiography			
# Optimize experimental use of DARHT	4,500	8,882	13,600
# Develop and apply comprehensive radiographic simulation and analysis tools, including accurate simulation capability for x-ray and proton transport, efficient and accurate techniques for characterizing radiographic data, and forward and inverse modeling capabilities to analyze radiographs	5,501	4,950	0
# Develop and implement a plan for materials	100	100	500
# Evaluate, design, and develop advanced x-ray radiographic capabilities to provide improved data from hydrodynamic tests to reduce uncertainty in code validation	10,142	14,393	18,500
# Develop proton radiography technology focused on refining advanced hydrotest technical requirements	6,879	9,530	8,700
# Begin development and certification of experimental vessels suitable for use in multi-axis radiography	0	0	1,700
Total, Advanced Radiography	27,122	37,855	43,000
Secondary Certification and Nuclear Systems Margins			
# Develop a validated, predictive computational capability for primary radiation emission, and complete a modern re-evaluation of primary outputs	7,040	11,400	11,300
# Determine the effects of HE-induced case dynamics, experimental determination of distribution and evolution of HE-induced case deformations for full-size systems	5,897	4,117	8,600
# Determine other effects of energy flow, including a validated predictive model capability for energy flow associated with primary explosion through to secondary explosion, and development of advanced energy-flow diagnostics for use on NIF and other AGEX facilities	17,718	16,817	14,600

(dollars in thousands)

Campaigns	FY 1999	FY 2000	FY 2001
# Determine performance of nominal, aged, and rebuilt secondaries, including development of a validated predictive capability to explain measurements associated with underground tests, implementation of advanced computational techniques, development of advanced hydrodynamic diagnostics, and support of related university activities	14,865	12,041	18,464
Total, Secondary Certification and Nuclear Systems Margins	45,520	44,375	52,964
Inertial Confinement Fusion Ignition and High Yield			
# Conduct experimental and calculational activities aimed at developing the physics basis for indirect drive and direct drive ignition	40,254	40,532	47,250
# Execute advanced high energy density physics experiments in support of the Stockpile Stewardship Program	20,000	19,900	27,700
# Develop the initial set of NIF core diagnostics and laser characterization diagnostics, and develop advanced target diagnostics	8,300	12,900	16,900
# Define, prototype, design, fabricate, test and deploy the NIF Cryogenic System	0	0	10,000
# Conduct the necessary experimental program in support of assessment of pulsed-power for high yield. Funding is not requested for High Average Power Lasers in FY 2001	18,950	16,779	7,200
# Headquarters supported activities include university grants in high energy density science, National Laser User Facility activities, national ignition program coordination, and support of critical technical needs	3,320	3,748	5,850
# Complete NEPA documentation, including environmental impact statement, environmental monitoring and permits, and complete assurances, safety analysis and integration (NIF OPC)	6,800	5,878	5,900
Total, Inertial Confinement Fusion Ignition and High Yield	97,624	99,737	120,800

Campaigns

(dollars in thousands)

	FY 1999	FY 2000	FY 2001
Certification in Hostile Environments			
# Provide validated, predictive response models for nuclear component survivability in neutron environments by implementing improved material models and implementing them into ASCI mechanical response codes	100	100	400
# Complete up-to-date calculations of weapons outputs, develop some AGEX capabilities to validate these calculations, and pursue accelerated calculations of weapons outputs	975	1,314	1,400
# Develop: silicon-on-insulator (SOI) semiconductor technology and no-upset system capability; comprehensive theory of System Generated Electromagnetic Pulse, radiation induced conductivity, and electron transport; improved radiation sources and diagnostics to support code validation and certification experiments; and validated codes for assessing performance in x-ray environments	15,324	12,337	13,600
Total, Certification in Hostile Environments	16,399	13,751	15,400
Defense Applications and Modeling (ASCI Component)			
# Advanced Applications - continue the development of enhanced 3-D computer codes that provide unprecedented levels of fidelity in weapons simulations. These codes will require the performance of the 10 and 30 TeraOps machines planned for 2000 and 2001, respectively. Applications will focus on 3-D prototypical codes capable of simulating the dynamic response of a re-entry vehicle system to normal flight environments and the explosion of the nuclear weapon with three-dimensional engineering features.	104,252	113,120	118,100
# Materials Physics and Modeling will continue to incorporate into ASCI application codes the behavior of materials that are used in the stockpile weapons as those materials are subjected to the conditions created by a nuclear explosion and as they age	68,060	80,820	94,000

(dollars in thousands)

Campaigns	FY 1999	FY 2000	FY 2001
# Verification and Validation will begin developing methodologies for assessing the accuracy and fidelity of the ASCI application programs, for example by testing code features against theory or data from experiments	10,850	33,792	37,000
Total, Defense Applications and Modeling	183,162	227,732	249,100
Weapons Systems Engineering			
# System Level Confirmatory Experiments will conduct system level experiments to demonstrate computational prediction of ground and flight test performance, ground test capability to confirm models, high-fidelity instrumented flight test configuration to confirm models within fewer flight opportunities, data acquisition/fusion and analysis supporting smarter system-level experiments	3,861	174	300
# Model Validation Experiments will provide experimental data to validate the models and codes provided by ASCI	20,039	14,518	15,000
# Instrumentation will develop the high fidelity instrumentation necessary (primarily for flight tests) to collect the right data with sufficient fidelity to be able to validate ASCI provided codes and models		232	1,000
Total, Weapons Systems Engineering	23,900	14,924	16,300
Enhanced Surety			
# Develop and demonstrate advanced initiation options, to include new concepts in stronglinks and firing systems, which would provide a higher assessed level of nuclear detonation safety	23,846	19,640	21,550
# Develop and demonstrate enhanced use denial options, internal and external to the warhead, which would provide a higher assessed level of performance	23,710	18,636	19,050
Total, Enhanced Surety	47,556	38,276	40,600
Enhanced Surveillance			

(dollars in thousands)

Campaigns	FY 1999	FY 2000	FY 2001
# Conduct a pit study to determine whether pit lifetimes equal or exceed 60 years (enabling substantial deferral or downsizing of a potential new pit manufacturing facility) and will develop and implement new, non-destructive examination tools for early detection of potential flaws	30,829	23,300	25,797
# Conduct a Canned Sub Assemblies (CSAs) study to determine when these major components as well as cases need to be replaced and will develop and implement new, non-destructive examination tools for early detection of potential changes in behavior	11,846	10,758	17,017
# Conduct a study in High Explosives/Energetics to determine when the full range of conventional and insensitive high explosives must be replaced. New diagnostic tools for early detection of potential changes to safety, reliability and performance will be developed and implemented	11,409	10,095	10,676
# Predict changes in critical non-nuclear material properties for both existing and replacement materials. These materials will be selected based on the highest risk for producing unacceptable degradation in weapon system performance	6,844	5,706	8,909
# Inform SLEP planning and system refurbishment decisions with validated performance predictions for high-risk, non-nuclear components and with identification of micro-systems failure mechanism and model-based certification process	5,977	4,189	5,808
# Provide new system-level diagnostics that enhance the ability to detect, assess and predict problems in the stockpile	15,972	19,994	21,444
Total, Enhanced Surveillance	82,877	74,042	89,651

Campaigns

(dollars in thousands)

FY 1999	FY 2000	FY 2001

Advanced Design and Production Technologies

	FY 1999	FY 2000	FY 2001
# Process Development (PD) focuses on continuous and innovative improvement of individual manufacturing procedures and incorporating advanced systems into plants. PD is essential to maintain and improve production capabilities in the weapons complex while satisfying increased environmental constraints, improved product reliability needs, improved manufacturing efficiency and changes in available materials and processes. FY 2001 activities include: demonstrating processes for fabricating and packaging high shock environment miniaturized circuitry, metal mold for pit processing, and carbon reduction in small electron beam furnace; and development of process technologies for enclosed operations for various materials	36,803	31,633	35,076
# Enterprise Integration interconnects the design and production talents of all the sites of the Nuclear Weapons Complex (NWC) with a single, integrated engineering information infrastructure. Enterprise Integration provides ready access to data and a quality of communication that removes the effect of distance. FY 2001 efforts include: deploying product information system, deploying need to know system, completing systems for W87 LEP data capture, and deploying enterprise models	16,556	16,079	12,829
# Integrated Product and Process Design (IPPD)/Agile Manufacturing develops, validates, and deploys the tools and technologies needed to support and use advanced computer aided and automated design and manufacturing systems. FY 2001 activities include: characterizing existing design/product/processes, developing material models, retrieve data for model validation, developing encapsulation model, and developing automated microplanning	42,846	23,726	26,730

(dollars in thousands)

Campaigns	FY 1999	FY 2000	FY 2001
# Deployment Program develops, validates, and deploys specific tools and technologies needed to support and use advanced computer aided and automated design and manufacturing systems in execution of specific SLEP efforts	13,425	4,055	200
# Robotics and Intelligent Machines (RIM)	0	900	900
Total, Advanced Design and Production Technologies	109,630	76,393	75,735
Pit Manufacturing Readiness			
# Pit Manufacturing Capability is aimed at capturing the technologies for pit production from the Rocky Flats Plant. This will be accomplished through demonstration of key manufacturing processes and fabrication of development units for the W88, the B61-7, and the W87. These activities have been completed for the W88 and remaining activities will focus on the W87 and the B61. Many of the process operations used at the Rocky Flats Plant are being installed at LANL; equivalent processes are being developed for those operations that cannot be duplicated. LANL is interfacing with LLNL for the W87	10,521	8,079	4,000
# Pit Initiative includes activities at LLNL necessary to support development of key manufacturing processes for the W87 in preparation for manufacture of a development unit and subsequent manufacture of war reserve (WR) W87 pits in support of the stockpile subsequent to W88 manufacturing. . . .	2,005	1,430	2,998
# Nonnuclear Technological Development and Production provides nonnuclear pit components to support the pit manufacturing program. Initial tasks will focus on process development and qualification of those processes needed to fabricate the parts that are currently most needed. In FY 2001, the program will initiate fabrication of nonnuclear parts needed for pit manufacture.	7,396	9,715	14,600
# Quality Assurance establishes and maintains a quality infrastructure for pit manufacturing	1,790	2,557	4,000

(dollars in thousands)

Campaigns	FY 1999	FY 2000	FY 2001
# Pit Production supports the fabrication of development pits for the W88, followed by the manufacture of a uniform lot of pits for process qualification, engineering and physics tests, and eventual certification and release of W88 pits for stockpile use	30,840	30,779	58,440
# Transition Manufacturing and Safety Equipment focuses on near term upgrades needed to implement the pit manufacturing mission at LANL. This includes maintenance upgrades at TA-55 to assure safety and reliability of facility operation and the replacement of aging research and development equipment through the purchase and installation of equipment required for pit manufacturing. Examples are glovebox diagnostics, foundry upgrades, metal preparation area upgrades, gauges, machining and metallography equipment and vault door and continuous air monitor replacement.	15,753	11,862	20,000
# Other Project Costs provides programmatic planning and support for specific project development and management activities on nuclear construction projects including NEPA coordination efforts, and safety analysis and technical risk assessment. Provides conceptual design for the construction activities necessary to achieve a sustained interim manufacturing capability and capacity	7,576	5,547	4,000
Total, Pit Manufacturing Readiness	75,881	69,969	108,038

(dollars in thousands)

Campaigns	FY 1999	FY 2000	FY 2001
Secondary Readiness			
# Conduct studies and develop upgrade/modernization plans, including conceptual and detailed designs, addressing the following infrastructure gaps: an assembly/disassembly facility for the assembly, disassembly, and surveillance of secondaries; a lithium facility for production of lithium hydride and lithium deuteride parts; a depleted uranium facility for the production of depleted uranium parts and other nonnuclear component; an enriched uranium manufacturing facility; a production support facility; an analytical chemistry/research & development laboratory, a non-special nuclear materials storage facility for storage of strategic assets other than highly enriched uranium; administrative/engineering/plant shift superintendent/fire hall/medical facilities; utility systems.			
# Take measures to address critical skill needs and issues. The specific actions to be undertaken include: activation of a recruiting activity with plans to hire in the May 2001, timeframe; a Technical Fellowship Program will be implemented which is designed to encourage current employees to acquire advanced degrees in technical fields important to our critical skills; summer interns and university co-op programs will be utilized to attract high-potential students for summer work and facilitate a mutual company-employee exposure to lay the groundwork for future hiring of permanent employees	0	0	15,000
Total, Secondary Readiness	0	0	15,000
Nonnuclear Readiness			
# Facilities/Infrastructure	800	0	0
Total, Nonnuclear Readiness	800	0	0
Materials Readiness			

(dollars in thousands)

Campaigns	FY 1999	FY 2000	FY 2001
# Materials Supply/Demand Assessment and Planning identifies national security materials on hand and needed in future and gaps and processes needed to transform materials into forms needed and surplus materials and associated disposition paths	19,858	21,705	23,447
# Material Processing and Disposition Capability addresses the production and recovery of additional materials and upgrades/modifications to equipment used to process materials and the restart of process equipment	9,870	8,914	8,500
# Material Storage Optimization identifies enhancements to storage infrastructures and develop strategy for, and install, storage capability/capacity	3,388	4,174	4,304
# Material Packages and Containers identifies storage packages/containers on hand and needed and develop strategy to address need	384	383	360
# Enabling Processes, Technology, and Analytical Tools identifies/develops processes, technology, and analytical tools needed to enable the other MRC major elements including monitoring technologies and robotics	4,400	3,912	3,900
Total, Materials Readiness	37,900	39,088	40,511
Tritium Readiness			
# Commercial Light Water Reactor establishes a tritium production system based on using a highly reliable and technically mature technology, CLWR, with tritium producing burnable absorber rods and construction of a tritium extraction facility at the Savannah River Site	56,000	48,814	58,000
# Accelerator Production of Tritium continues engineering development and demonstration activities needed to support the preliminary design definition of accelerator systems, structures, and components. Maintain option with the APT Prime Contractor to complete preliminary design of the APT facility	85,000	51,788	19,000
Total, Tritium Readiness	141,000	100,602	77,000
Subtotal, Campaigns	999,573	928,598	1,049,907

Explanation of Funding Changes from FY 2000 to FY 2001

	FY 2000 vs. FY 2001 ($000)
Campaigns	
Primary Certification performs increasingly complex integrated hydrodynamic radiography and subcritical experiments for development of simulation codes and weapon certification . .	11,932
Dynamic Materials Properties increases to accommodate more extensive determination of plutonium equation of state, phase diagram and response under high-pressure and dynamic conditions.	2,022
Advanced Radiography optimizes the first axis beam on DARHT which became operational in FY 1999. Conducts research and development to begin to define the requirements for advanced radiography capabilities to support certification of refurbished and replaced primaries. This increase has been partially offset by simulation tools being developed in the Defense Applications and Modeling Campaign	5,145
Secondary Certification and Nuclear Systems Margins increases to support design of aboveground experiments to examine HE-induced case dynamics and performance issues required for code validation and to enhance capabilities in hydrodynamic modeling	8,589
Inertial Confinement Fusion Ignition and High Yield increases to support the design and development of the NIF Cryogenic System, the development of the initial set of core target diagnostics and laser characterization diagnostics for NIF, ignition target design and development and experiments to verify conditions necessary for ignition, weapons physics experiments which also support other Stewardship campaigns, and additional grants and national ignition program coordination and technical activities	21,063
Certification in Hostile Environments increases to start the development of System Generated Electromagnetic Pulse model validation for the ASCI codes to support the W76 Arming Firing and Fusing (AF&F) certification, to work on 0.5 Fm rad/hard (silicon-on-insulator) technologies for the W76 and future AF&F refurbishments , and to accelerate the calculations of weapons outputs	1,649
Defense Applications and Modeling increases to support Phase I of primary burn code validation within Advanced Applications; Verification and Validation efforts for evaluation of accuracy and fidelity of complex ASCI simulation codes; and Materials Physics and Modeling activities to incorporate the behavior of stockpile materials, both when subjected to nuclear explosion and when aged, into ASCI application codes	21,368
Weapons Systems Engineering increases due to necessary preparations (instrumentation, models/code validation) for the first Beta (full system W76) Flight Environment Test in FY 2002 and first Beta (W76 Full System Thermal) Abnormal Environment Test in FY 2003 . .	1,376

	FY 2000 vs. FY 2001 ($000)
Enhanced Surety increases to accept and test weapon surety subsystems based on LIGA (German acronym for a technique of fabricating small parts with high precision) and micro system technologies, for advanced container concept testing and evaluation, and for component supplier development and qualification	2,324
Enhanced Surveillance increases to conduct a pit study to determine whether pit lifetimes equal or exceed 60 years (enabling substantial deferral or downsizing of a potential new pit manufacturing facility) and develop and implement new, non-destructive examination tools for early detection of potential flaws	15,609
Modeling and simulation tools and information management technologies in the **Advanced Design and Production Technologies (ADAPT)** campaign	-658
Pit Manufacturing Readiness will focus on continuing the manufacture of development pits leading towards the manufacture of a certifiable W88 pit. Subsequent to FY 2001, activities will move from manufacturing development pits to steady state manufacture of pits for qualification and production pits for placement into the stockpile	38,069
The **Secondary Readiness** campaign will be initiated in FY 2001 and will conduct studies and develop upgrade/modernization plans to address secondary manufacturing infrastructure gaps and take measures to address critical skills need and issues in a systemic way	15,000
Materials Readiness increase provides funding for the DOE Business Center for Precious Metals	1,423
Tritium Readiness decrease is associated with a continued ramp down of planned engineering development activities and the suspension of preliminary design of the APT facility. Approval to restart and complete the preliminary design will be based on the status of the primary technology through FY 2003. Funding increases for the CLWR technology as the Tritium Producing Burnable Absorber Rod (TPBAR) component procurement increase as the first batch of TPBARs are manufactured for irradiation. CLWR funding also increases for reactor licensing and preparations	-23,602
Subtotal, Campaigns	121,309